MICHIGAN

FOREST PEST DETECTION PROGRAM

REPORT FOR 1958

COMPILED BY:

FORESTRY DIVISION, MICHIGAN DEPARTMENT OF CONSERVATION

COOPERATORS:

STATE DEPARTMENT OF AGRICULTURE, U. S. FOREST SERVICE, MICHIGAN STATE UNIVERSITY, UNIVERSITY OF MICHIGAN, PRIVATE FOREST INDUSTRY

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INTRODUCTION

The Michigan Forest Pest Detection Program functions through the cooperation of many individuals, public agencies and private companies. Greatly increased interest in the problems of forest insects and diseases in the past few years, coupled with a reasonable and coordinated approach, have kept the program moving forward on an even keel to a point where it is making an increasingly valuable contribution to the welfare of the forests of the state.

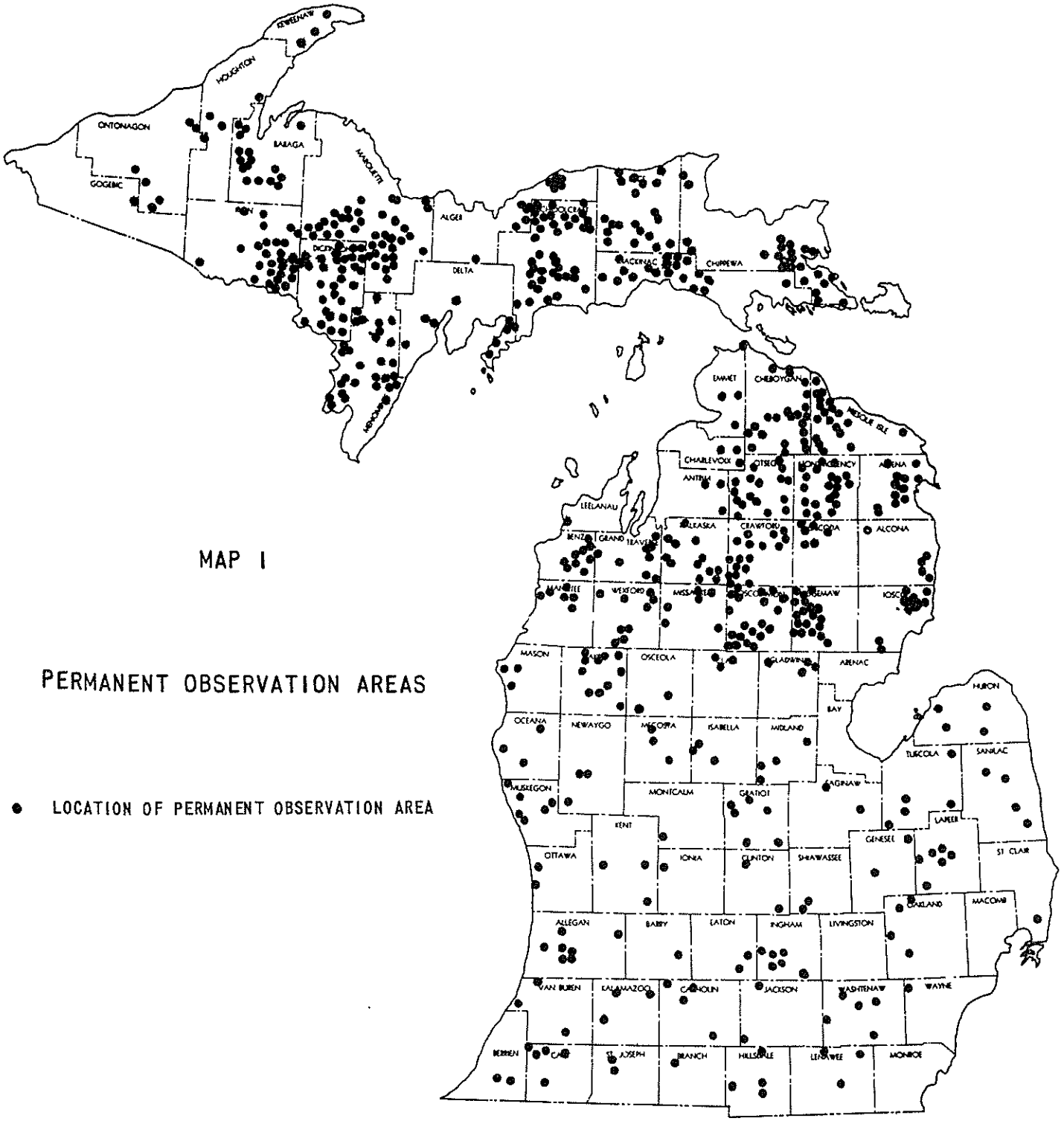
Cooperation with neighboring states in regional activities is an important part of the program. The eighth Annual Lakes States Forest Insect Survey Conference was held in Minneapolis in February with representatives of federal, state and private agencies participating. The major problem confronting this group is the standardization and coordination of survey techniques and activities in Minnesota, Wisconsin and Michigan. To this end, standardized survey techniques have been approved for the spruce budworm, larch sawfly, forest tent caterpillar, Saratoga spittlebug, jack pine budworm, pine tortoise scale, and the red-headed pine sawfly.

Close coordination between corresponding agencies in the Great Lakes region has been possible through the formation of the Central International Forest Insect and Disease Conference. At this conference, entomologists, pathologists and foresters from the three Lake States and adjoining Canadian Provinces are able to discuss mutual forest pest problems and present research findings. The seventh meeting of this conference was held in September at Ely, Minnesota.

On November 18 the annual meeting of the Michigan Forest Pest Detection Program committee was held in Lansing to review the work carried on during the year by the various agencies concerned with surveys, control and research; to discuss the annual report, and to make plans for 1959, particularly in regard to possible control projects. Those in attendance were: U. M. Martilla, J. K. Kroeber, S. A. Graham, W. S. Cath, W. J. Young, P. R. Flink, N. F. Smith, D. F. Lovitt, J. W. Butcher, T. D. Stevens, W. E. Miller, H. J. MacAloney, V. J. Rudolph, H. J. Heikkenen, J. W. Wright and R. L. Talerico.

The following report of the activities of the Michigan Forest Pest Detection Program during 1958 was prepared by the Forestry Division of the Michigan Department of Conservation.

* * *



MAP I

PERMANENT OBSERVATION AREAS

● LOCATION OF PERMANENT OBSERVATION AREA

ORGANIZATION OF PROGRAM

Increasing awareness and concern about losses caused by insects and diseases to the forests of Michigan led to the beginning of a forest pest detection program in 1950. The program was outlined and organized by the Conservation Department with the cooperation of the U. S. Bureau of Entomology and Plant Quarantine (now the Division of Forest Insect Research, U. S. Forest Service), the U. S. Forest Service; the School of Natural Resources, University of Michigan; the Departments of Entomology, and Botany and Plant Pathology, and Forestry Extension Service, Michigan State University; the Division of Plant Industry, State Department of Agriculture.

The program involves more than the mere detection of forest pest outbreaks, its objectives being: (1) to detect the presence of forest insects and diseases, and to apprehend outbreaks by systemtically and annually collecting records of occurrence and damage; (2) to facilitate and organize direct control in case of emergency; and (3) to provide a basis for protective measures by indirect means.

The detection framework is built principally around the field organization of the Forestry Division of the Conservation Department, which handles state and private lands and the U. S. Forest Service which handles federal lands. The general field plan for insects insofar as the State Forestry Division districts are concerned, calls for the establishment of permanent observation areas scattered throughout each forest district on both state and private lands in timber stands where critical insects exist or are likely to appear. (See Map I). Observation reports are submitted annually to the Lansing office of the division, indicating the degree of infestation, or the absence, of each of the critical insects on the designated plots. Those critical insects found only in the southern part of the state are not reported on in the northern regions, and vice versa. Thus, each district forester has only six to eight critical insects to observe.

The two educational institutions participate in training programs and act in an advisory capacity on insect and disease identification and control measures, as does also the Division of Forest Insect Research of the U. S. Forest Service.

The State Department of Agriculture, through its Division of Plant Industry, is directly concerned in the program by virtue of its statutory authority to establish quarantines, to enter on private lands for purposes of inspection, and, where necessary, to compel or provide for the control of serious insect pests and contagious plant diseases.

The disease phase of the program does not follow the same routine as applied to insects, since there are relatively few "critical" forest diseases requiring constant surveillance. Individual programs have been developed for the most important diseases with various state and federal agencies cooperating in survey and control work.

* * *

PEST INFORMATION SHEETS

A series of pest information sheets was initiated in 1956 as a function of the Michigan Forest Pest Detection Program in response to requests by plantation owners, tree farmers, foresters and others for uniform and simplified information on the important pests of forest trees. Augmented in the two succeeding years, 20 individual sheets have been prepared. Pests now covered are white pine weevil, European pine sawfly, European pine shoot moth, Saratoga spittlebug, red-headed pine sawfly, eastern spruce gall aphid, larch sawfly, forest tent caterpillar, eastern tent caterpillar, mites or red spiders, anomala beetle, spruce budworm, jack pine budworm, birch skeletonizer, walkingstick, pine spittlebug, pine sawyer beetle, pine needle rust, hardwood defoliators and eastern gall rust.

Basic information and sketches are prepared by Paul R. Flink, Forestry Division entomologist, and all material and recommendations are approved and agreed upon by the agencies cooperating in the Pest Detection Program. The leaflets can be readily changed and reprinted as changes in control recommendations or other information warrant. The leaflets on the European pine shoot moth and white pine weevil were revised during 1958.

A total of 35,190 leaflets was distributed during the period, 1956 to 1958. In addition, the separate sheets have now been assembled into a booklet entitled "Michigan Forest Pests", which has been distributed to cooperators, land owners, teachers and others with a direct interest in forest pest problems.

Leaflets on part or all of the following pests are contemplated during 1959: pine tortoise scale, Zimmerman pine moth, larch casebearer, woolly aphid, and gall insects.

SPECIAL REPORTS

In addition to the routine requests for insect observation reports, special reports, in the form of general memorandums, were issued throughout the year whenever it was advisable to alert the cooperators to unusual conditions, time for control application or other important information.

Suggested news releases were sent to the Department foresters for their use, saving them the time required to write such articles.

TRAINING SESSIONS

There were no special training sessions held during 1958 for the cooperators. However, all state forest districts except one in the northern Lower Peninsula and Upper Peninsula were visited by the entomologist and several special problems investigated.

TRAINING SESSIONS (Cont'd.)

Programs on tree pests were participated in by the Forestry Division entomologist at six tree growers meetings. Participation in these programs was requested by county agricultural agents and Soil Conservation Service personnel. These programs were designed to acquaint tree growers with the tree pests in their area and the means of combatting them.

A fifteen-minute TV program on forest pests was produced and distributed to the eleven Michigan and two out-of-state stations carrying the "Michigan Conservation" program.

COOPERATIVE REPORTS

The pest detection program provides information for other cooperative reports as follows:

Cooperative Economic Insect Report -- Information on insect infestations and seasonal development is sent to Professor Ray Huson, Department of Entomology, Michigan State University, who forwards it to the Plant Pest Control Division, Agricultural Service, U. S. Department of Agriculture, for inclusion in the Cooperative Economic Insect Report. This report is a weekly resume of important insects in the United States and includes a section on forest insects.

The Forest Insect and Disease Situation in the Lake States --Annually the forest pest situation in the Lake States is summarized by the Lake States Forest Experiment Station from information submitted by the states and also collected by the Station. The forest insect situation in Michigan as reported in the annual report of the Pest Detection Program is forwarded to the Station for inclusion in the Lake States report.

A Status Report of Forest Insect Conditions -- The information compiled in the previously mentioned report by the Lake States Forest Experiment Station is included in the Status Report of Forest Insect Conditions covering the United States and published annually by the Division of Forest Insect Research, Forest Service, U. S. Department of Agriculture in Washington, D. C.

* * *

SPECIAL SURVEYS

Special surveys on state land were primarily directed towards the red-headed pine sawfly. An aerial survey was made to determine the extent of the red-humped oakworm defoliation. The U. S. Forest Service conducted surveys on the Saratoga spittlebug, red-headed pine sawfly, white pine weevil, European pine shoot moth and jack pine budworm.

RED-HEADED PINE SAWFLY

Pre-control egg surveys for the red-headed pine sawfly were made in July, 1958, in areas where moderate to heavy infestations were present or expected to occur as indicated by surveys during 1957. A total of 3,077 acres was surveyed to determine the need for control measures.

Examination of red and jack pine plantations on the Pigeon River State Forest disclosed the need for controlling the sawfly on 480 acres of the 863 checked, on 140 acres of the 308 acres sampled on the Hardwood State Forest, and on 265 acres of the 1906 acres examined on the Fife Lake State Forest.

Some sawfly colonies were found in all plantations. However, control was not justified in many areas where the trees were large enough to withstand a light infestation without being seriously damaged.

RED-HUMPED OAKWORM

During October, an aerial survey was made of the known areas of red-humped Oakworm defoliation in west central Lower Peninsula. Noticeable defoliation was mapped in the following counties: Lake, 4880 acres; Newaygo, 9,720 acres; Muskegon, 160 acres; Ottawa, 700 acres; Allegan, 4,200 acres; Mason, 960 acres; and Oceana, 320 acres. (See Map II) The areas which had been heavily defoliated in 1957 in Lake, Newaygo and Muskegon counties were for the most part not defoliated in 1958.

* * *

CONTROL PROJECTS

Control projects on state land in 1958 were directed against the red-headed pine sawfly, white pine weevil, European pine shoot moth, Dutch elm disease, white pine blister rust and white grubs; and on U. S. Forest Service land against the red-headed pine sawfly, European pine shoot moth, white pine weevil, white pine blister rust and Saratoga spittlebug. On private land control was mainly directed toward the white pine weevil, European pine shoot moth, anomala beetle and pine sawflies in Christmas tree plantations, and in some resort areas against the red-humped oakworm.

Details of the gypsy moth, oak wilt and Dutch elm disease and white pine blister rust control programs are given under the sections on "Other Important Insects", and "Diseases".

WHITE PINE WEEVIL

Hand spraying by inmate crews, using a lindane-aroclor mixture, recently recommended by the Northeastern Forest Experiment Station, was used to prevent white pine weevil attack in the Fife Lake State Forest on 87 acres in Wexford County, 121 acres in Grand Traverse County and 31 acres in Leelanau County. As a result less than one percent of the trees were weeviled in the sprayed plantations as compared to 25% in the same plantations in 1957 and 40 to 50% in nearby unsprayed plantations in 1958. Other small areas were sprayed on the Fife Lake and Au Sable State Forests by the Conservation Department and Michigan State University to test different insecticide formulations.

On the Hardwood State Forest prison inmate labor was used for clipping and burning weevil infested tops on 115 acres in Emmet County. Similar treatments were used on the Fife Lake State Forest on 240 acres in Wexford County and 111 acres in Grand Traverse County.

The U. S. Forest Service used the lindane-aroclor mixture to control the weevil on 23 acres of Norway spruce in Gogebic County in the Upper Peninsula.

RED-HEADED PINE SAWFLY

High populations of the red-headed pine sawfly necessitated control projects on 1,090 acres. Aerial application of one pound of DDT per acre was used on 480 acres in Otsego County on the Pigeon River State Forest, 140 acres in Emmet County on the Hardwood State Forest and 35 acres in Benzie County on the Fife Lake State Forest. The cost for the larger block in Otsego County was $1.34 per acre for airplane and spray and $1.50 per acre for the other two areas. Excellent control was attained.

Inmates with hand sprayers sprayed individual sawfly colonies in the following counties on the Fife Lake, Houghton Lake and Au Sable State Forests: Wexford, 125 acres; Grand Traverse, 65 acres; Leelanau, 40 acres; Kalkaska, 92 acres; Clare, 100 acres; and Missaukee, 13 acres. The results of this spraying have not yet been evaluated.

Aerial sprays were applied by the U. S. Forest Service on 48 acres to control the red-headed pine sawfly in Delta County in the Upper Peninsula. An additional 30 acres were hand sprayed on the Baldwin District of the Lower Michigan National Forests.

EUROPEAN PINE SHOOT MOTH

A hydraulic sprayer mounted on a power wagon was used to spray 23 acres of red and white pine in Emmet County on the Hardwood State Forest. This plantation was lightly infested and had been surrounded by 300 acres of newly-established plantations. Control results were good although complete kill was not attained.

EUROPEAN PINE SHOOT MOTH (Cont'd.)

Hand clipping of infested buds in late May and early June by inmate crews and regular labor was used on 162 acres on the Fife Lake Forest. Hand clipping is used only in areas of light infestation and the results depend on the interest and supervision of the clipping crew. Some infested tips are invariably missed. The results of this type of control have not yet been evaluated.

A total of 8,543,000 red pine seedlings and transplants was fumigated with methyl bromide prior to leaving the state forest nurseries in the fall of 1957 and spring of 1958. All stock from beds where shoot moths were found or adjacent beds were treated. (Figure 1.)

All red pine beds two years and older were sprayed twice during the summer with DDT. An intensive spray program will be followed in the nurseries and fumigation will be used only when spray control is not complete.

The U. S. Forest Service treated with mist blowers 190 acres of L. U. lands in Ottawa County and 203 acres of National Forest land on the Cadillac District of the Lower Michigan National Forests.

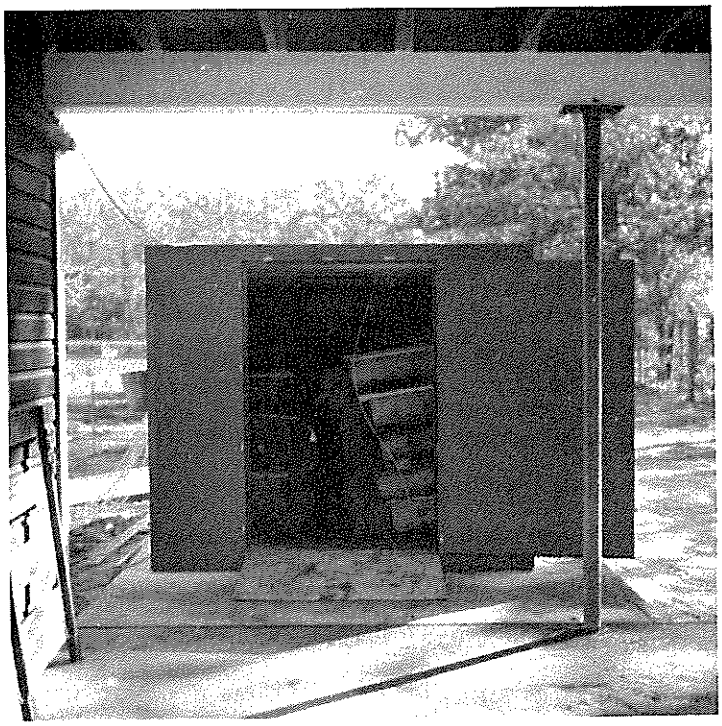


Figure 1.

Fumigation chamber at Higgins Lake Nursery used for treatment of nursery stock with methyl bromide gas for European pine shoot moth control.

WHITE GRUBS

Severe infestations of white grubs in the Danaher plains area of Luce County necessitated spraying the red pine roots with aldrin as they were being planted on 168 acres. The aldrin solution is applied with a small sprayer mounted on the planting machine. The spray machine and technique were developed by the Nekoosa-Edwards Paper Company and the University of Wisconsin. A foot pump forces the aldrin solution out of a nozzle in the planting shoe onto the tree roots and surrounding soil. After one season, 97 percent of the treated trees were alive as compared to 84 percent of the unsprayed trees. It is expected that a greater difference will show up next year.

SARATOGA SPITTLEBUG

The U. S. Forest Service aerial sprayed 66 acres in Delta County to control the Saratoga spittlebug.

* * *

FOREST INDUSTRY COOPERATION

Industry foresters cooperate in the detection program by reporting on observation plots in areas not covered by state and federal foresters and thus help in presenting a better over-all picture of forest insect conditions in the state. In addition, industry foresters are called upon to assist in special surveys of concern to the companies.

The following companies, including six pulp and paper companies, four mining companies, and two power companies are now actively participating in the forest pest detection program.

Abitibi Corporation
American Box Board Company
Calumet and Hecla
Cleveland Cliffs Iron Company
Consolidated Water Power and Paper Company
Consumers Power Company
Copper Range Company
Escanaba Paper Company
Kimberly-Clark of Michigan, Inc.
Marathon Corporation
Oliver Mining Company
Wisconsin-Michigan Power Company

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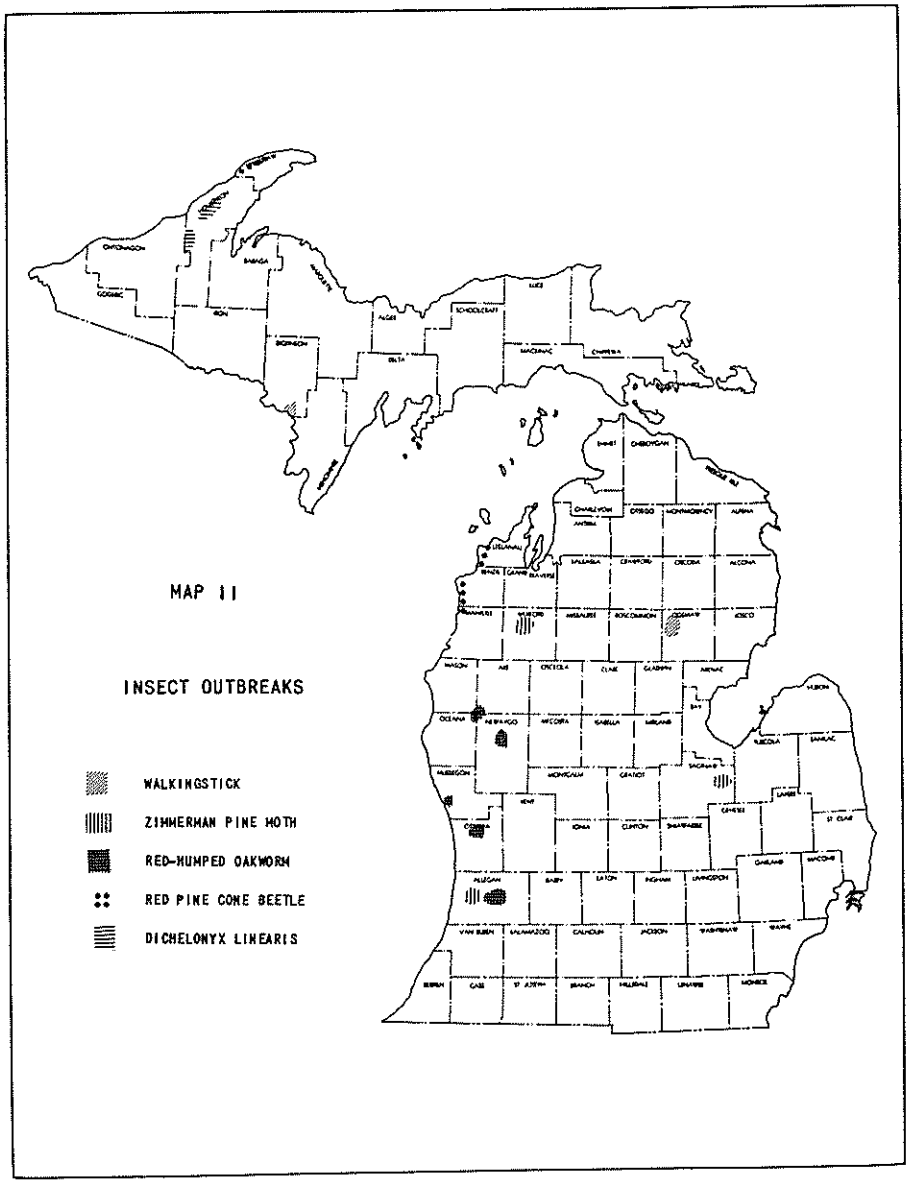
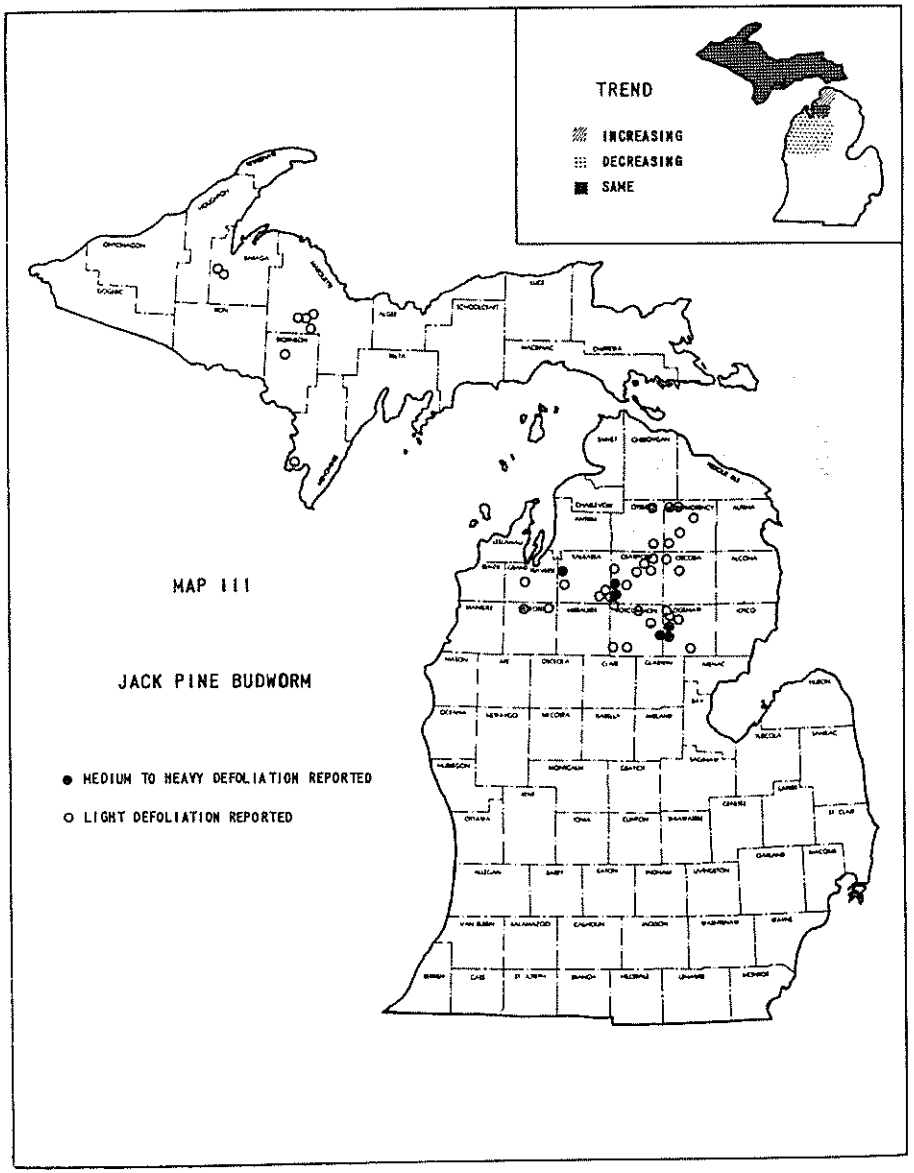

MAP II
INSECT OUTBREAKS
WALKINGSTICK
ZIMMERMAN PINE MOTH
RED-HUMPED OAKWORM
RED PINE CONE BEETLE
DICHELONYX LINEARIS


TREND
INCREASING
DECREASING
SAME
MAP III
JACK PINE BUDWORM
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED

OBSERVATION REPORTS

A total of 1,966 observation reports was received and analyzed by the Lansing office of the Forestry Division. This number has been approximately the same for the past five years. In addition to the regular observation reports, letters and cards were received with observations on other forest insect conditions.

The total number of permanent observation areas is now 692, approximately the same as in 1957. (See Map I.)

* * *

CRITICAL INSECTS

The list of critical insects in Michigan has been changed from time to time to include actively or potentially injurious insects and to remove from the list those which are no longer considered thus.

No additions or deletions were made in the critical insect list reported on in 1957 nor are any changes expected to be made in 1959.

JACK PINE BUDWORM - Choristoneura pinus Free.

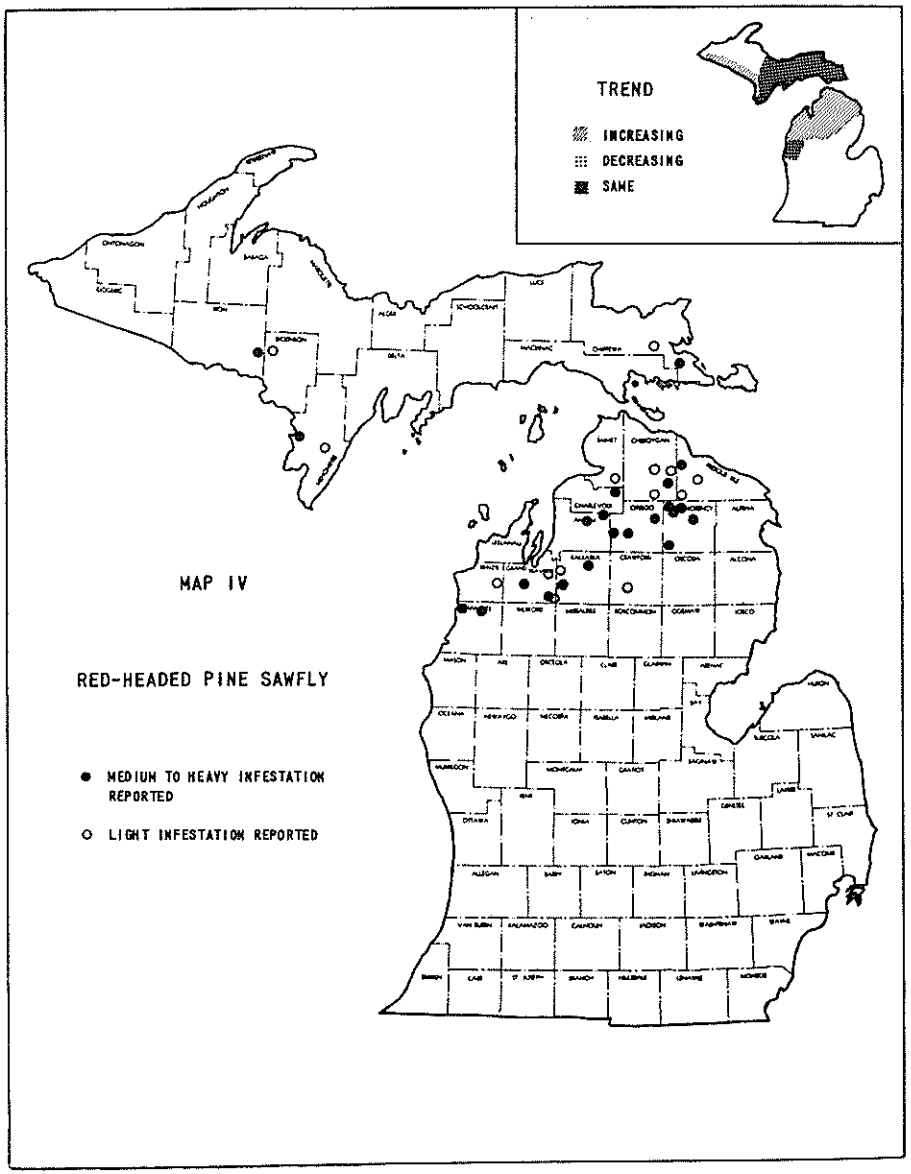
Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958
Total.....	135	185	232	280	291	276	267	269
Percent Positive.....	38	40	32	20	20	29	22	19

Breakdown of 1958 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....6.....(12%)
Light defoliation (1-20%).....45.....(88%)

Jack pine budworm populations declined greatly in the central and west central regions of the Lower Peninsula. Particularly noticeable was the decline in the Montmorency-Oscoda county area where stands were heavily infested


TREND
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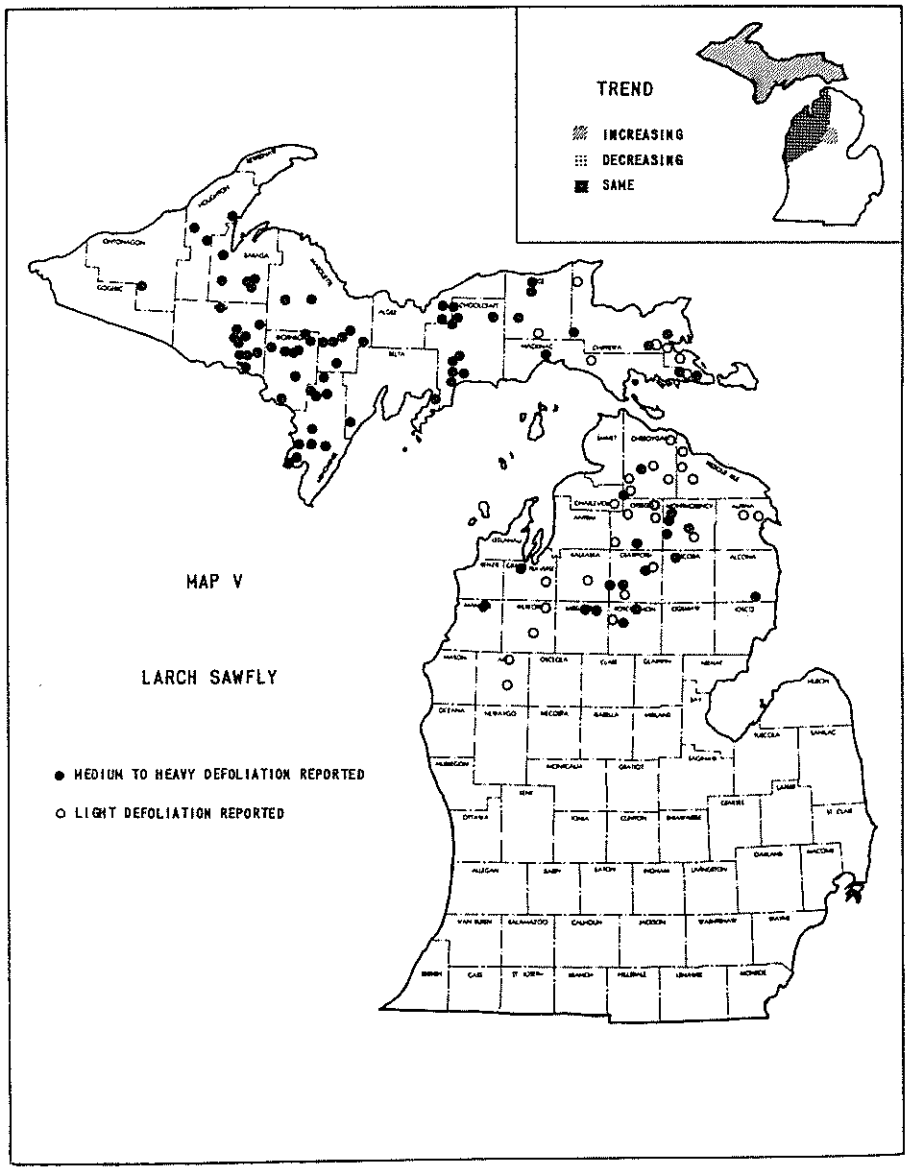
MAP IV
RED-HEADED PINE SAWFLY
MEDIUM TO HEAVY INFESTATION REPORTED
LIGHT INFESTATION REPORTED


TREND
INCREASING
DECREASING
SAME
MAP V
LARCH SAWFLY
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED

JACKPINE BUDWORM (Cont'd.)

in 1957 and the budworms were virtually absent in 1958. Generally, the overall infestation in the Lower Peninsula was the lowest it has been in several years, although moderate defoliation was reported in Kalkaska, Crawford and Ogemaw counties. (See Map III.)

Areas in Dickinson, Baraga and Marquette counties in the central Upper Peninsula continued to show light defoliation as reported first in 1957. Light defoliation was reported in Menominee County. Otherwise, the population remained at a low level in the Upper Peninsula.

A continued decline in budworm populations throughout the Lower Peninsula is expected in 1959.

RED-HEADED PINE SAWFLY - Neodiprion lecontei (Fitch)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958
Total.....	133	173	231	230	260	255	239	249
Percent Positive.....	18	7	8	8	5	5	16	14

Breakdown of 1958 Reports

Heavy defoliation (11-100% susceptible trees attacked)....2....(6%)
Medium defoliation (2-10% susceptible trees attacked).....20....(55%)
Light defoliation (0-1% susceptible trees attacked).....14....(39%)

Red-headed pine sawfly populations remained at the same high levels as in 1957 in the northwestern Lower Peninsula. Colonies of larvae could be found in almost all young red and jack pine plantations. Sawfly populations were noted in increasing numbers in the northeastern counties of the Lower Peninsula where the insect had remained in low enough numbers to escape detection in recent years.

Severe infestations were found on strips of foot high red pine planted adjacent to 6 or 7 foot jack pine. This necessitated controlling the insects on larger pine as well as the small trees even though serious damage was not expected to occur to the taller trees.

Moderate to heavy defoliation was reported in Chippewa and Dickinson counties in the Upper Peninsula and Presque Isle, Cheboygan, Antrim, Otsego, Montmorency, Kalkaska, Grand Traverse and Manistee counties in the Lower Peninsula. (See Map IV.)

Infestations will probably remain high in the northwestern Lower Peninsula and an increase is expected in the northeastern area. Control operations will probably be warranted in most of these areas.

LARCH SAWFLY - Pristiphora erichsonii (Htg.)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958
Total.....	68	113	137	135	145	140	133	131
Percent Positive.....	0	30*	42	73*	66	81	85	95

* The apparent increase is largely due to intensified surveys rather than buildup of insect populations.

Breakdown of 1958 Reports

Heavy defoliation (61-100%).....60.....(48%)
Medium defoliation (21-60%).....27.....(22%)
Light defoliation (1-20%).....38.....(30%)

Larch stands throughout the Upper Peninsula and northern Lower Peninsula were infested in 1958. Positive reports only were received from the Upper and Lower Peninsulas north of town line 20 north, with the exception of Benzie, Grand Traverse, Manistee and Roscommon counties where some uninfested stands were reported.

Twenty percent or less defoliation was reported in some stands in Luce, Chippewa and Mackinac counties. Otherwise, all stands in the Upper Peninsula suffered at least 20 percent defoliation and most stands in the western two-thirds were more than 60 percent defoliated.

Some larch mortality has been reported and can be expected to increase if the outbreak continues as anticipated. (See Map V.)

SARATOGA SPITTLEBUG - Aphrophora saratogensis (Fitch)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958
Total.....	17	51	164	211	229	225	214	240
Percent Positive.....	88	27	34	23	28	27	30	32

Breakdown of 1958 Reports

Heavy injury (61-100%).....0.....(0%)
Medium injury (21-60%).....4.....(5%)
Light injury (1-20%).....72.....(95%)

Population levels of the Saratoga spittlebug have increased through much of the northern Lower Peninsula. Although no spots of heavy damage occurred on the observation areas, conspicuous damage was present in Newaygo, Isabella,

SARATOGA SPITTLEBUG (Cont'd.)

Cheboygan, Montmorency, Ogemaw, Wexford and Presque Isle counties.

Damage even within infested stands was spotty, being serious only where sweet fern, the alternate host, was abundant. It is expected that this insect will become more important in 1959 and control measures will have to be taken in some areas. (Figure 2.)

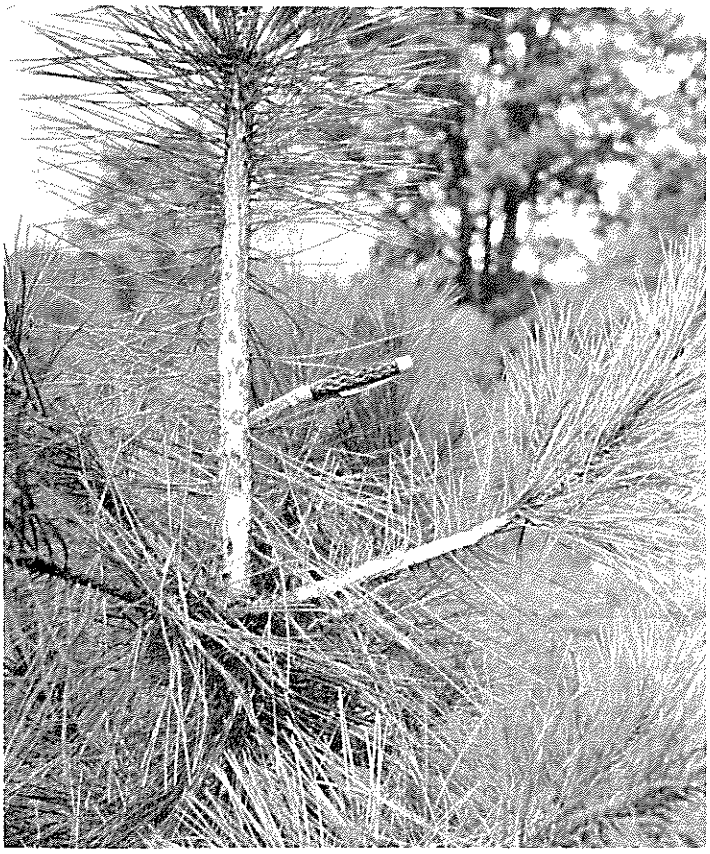


Figure 2.

Saratoga spittlebug feeding injury shows up as brown resin-filled spots under the bark. Coalescence of these areas kills the branch by stopping the resin flow.

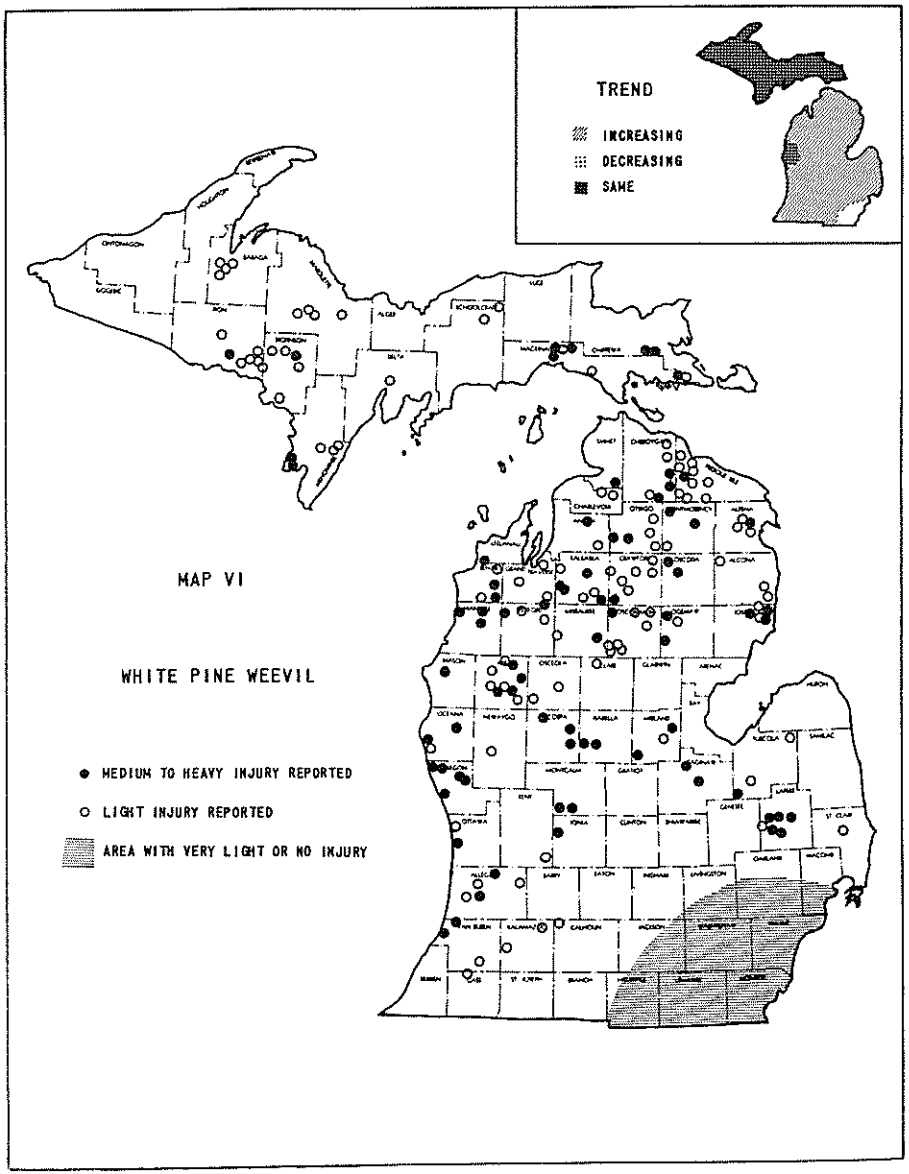
WHITE PINE WEEVIL - Pissodes strobi (Peck)

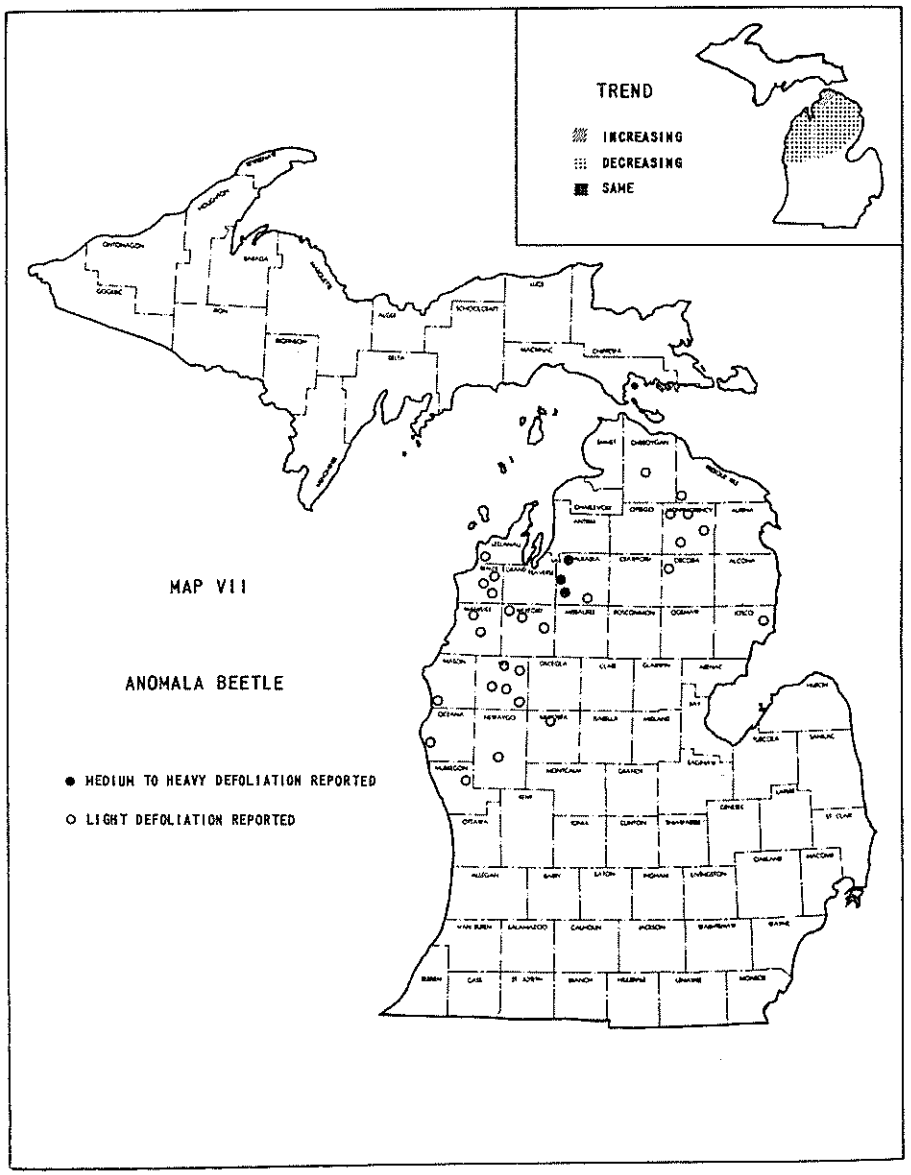
Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958
Total.....	39	33	231	278	319	306	317	335
Percent Positive.....	82	64	65	59	60	53	56	62

Breakdown of 1958 Reports

Heavy injury (41-100% of leaders killed).....20.....(10%)
Medium injury (11-40% of leaders killed).....58.....(29%)
Light injury (1-10% of leaders killed).....126.....(61%)


TREND
INCREASING
DECREASING
SAME
MAP VI
WHITE PINE WEEVIL
MEDIUM TO HEAVY INJURY REPORTED
LIGHT INJURY REPORTED
AREA WITH VERY LIGHT OR NO INJURY


TREND
INCREASING
DECREASING
SAME
MAP VII
ANOMALA BEETLE
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED

WHITE PINE WEEVIL (Cont'd.)

The white pine weevil continues to be the major pest of young white and jack pine. Populations were at a light to moderate level in the Upper Peninsula and a moderate to heavy level in the Lower Peninsula. Throughout much of the Lower Peninsula the weevil continued to increase in severity of infestation on jack, white, Scotch and red pines.

Weeviling of over 40 percent in some jack pine plantations was reported in Chippewa County in the Upper Peninsula and Emmet, Cheboygan, Otsego, Leelanau, Kalkaska, Benzie, Manistee, Wexford, Crawford, Iosco, Muskegon and Allegan counties in the Lower Peninsula. Trees in some stands where weeviling has been heavy for several years are bush-like with many leaders. Several leaders as well as side and bottom branches may be attacked on these trees. (Figure 3.)

The weevil remains absent in the extreme southeastern section of the Lower Peninsula. (See Map VI.)

It is expected that the weevil will continue causing serious injury and control measures will be undertaken where the value of the stands justifies the expenditure.

Figure 3.

White pine weevil larvae feeding under the bark kills the leaders causing side branches to become leaders and results in crooked or forked trees.

ANOMALA BEETLE or PINE CHAFER - Anomala oblivia Horn

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958
Total.....	119	181	236	278	275	271	269	243
Percent Positive.....	35	36	32	38	38	37	22	14

Breakdown of 1958 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....3.....(9%)
Light defoliation (1-20%).....30.....(91%)

The anomala beetle populations in the Lower Peninsula continue to decline with the exception of Emmet and Cheboygan counties. Some light feeding occurred in most of the counties in the northern Lower Peninsula and moderate feeding reported only in Kalkaska County.

This pest is not known to be present in the Upper Peninsula, although one unconfirmed report of its presence was received. (See Map VII.)

EUROPEAN PINE SHOOT MOTH - Rhyacionia bouliana (Schiff.)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958
Total.....	44	80	119*	203	207	258	242	229
Percent Positive.....	80	40	47	39	49	42	48	51

* Increase due to inclusion of insect on critical list of districts in northern half of Lower Peninsula.

Breakdown of 1958 Reports

* Heavy injury.....50.....(43%)
* Medium injury.....2.....(2%)
* Light injury.....65.....(55%)

* Degree of injury = "I" = $\frac{\%\text{ of susceptible trees attacked} \times \%\text{ of tips infested}}{100}$

Heavy if "I" is greater than 20
Medium if "I" is between 10 and 20
Light if "I" is less than 10

The European pine shoot moth continued its spread and depredations of planted and natural red pine. Severe distortion of red and Scotch pines is occurring in much of the Lower Peninsula and in Houghton, Schoolcraft and

EUROPEAN PINE SHOOT MOTH (Cont'd.)

Mackinac counties in the Upper Peninsula. It has also been found in Luce and Chippewa counties in the U. P.

Severe low winter temperatures in many northern areas of the Lower Peninsula drastically reduced the shoot moth population allowing the trees to grow normally. Near the shores of the Great Lakes and in the southern part of the state where temperatures did not drop to 18°F below zero, shoot moth survival was high and injury severe. (See Map VIII.)

EUROPEAN PINE SAWFLY - Neodiprion sertifer (Geoff.)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958
Total.....	31	64	85	82	111	100	104	91
Percent Positive.....	87	69	74	75	74	62	56	59

Breakdown of 1958 Reports

* Heavy defoliation.....1.....(2%)
* Medium defoliation.....0.....(0%)
* Light defoliation.....53.....(98%)

* Degree of defoliation = "D" =

$$\frac{\text{\% of susceptible trees attacked} \times \text{\% of defoliation}}{100}$$

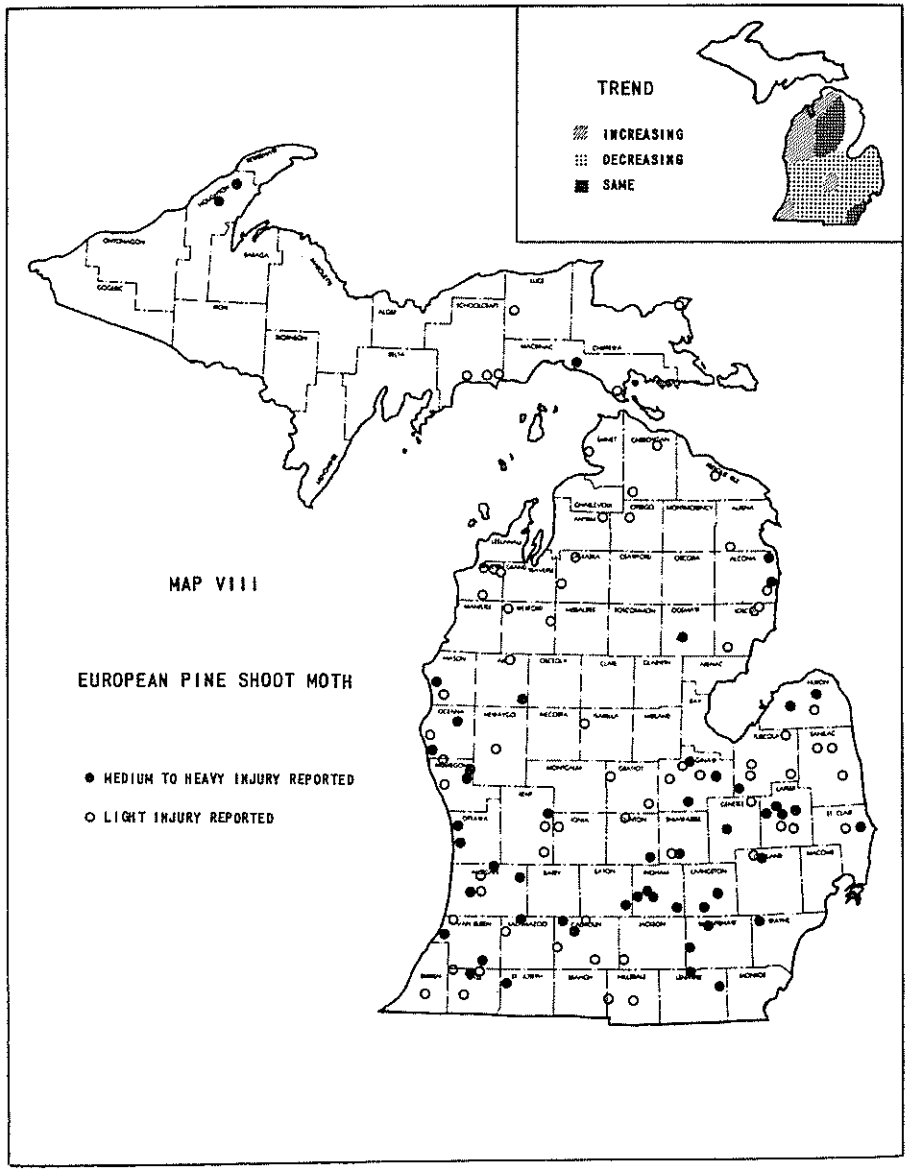
Heavy if "D" is greater than 24
Medium if "D" is between 9 and 24
Light if "D" is less than 9

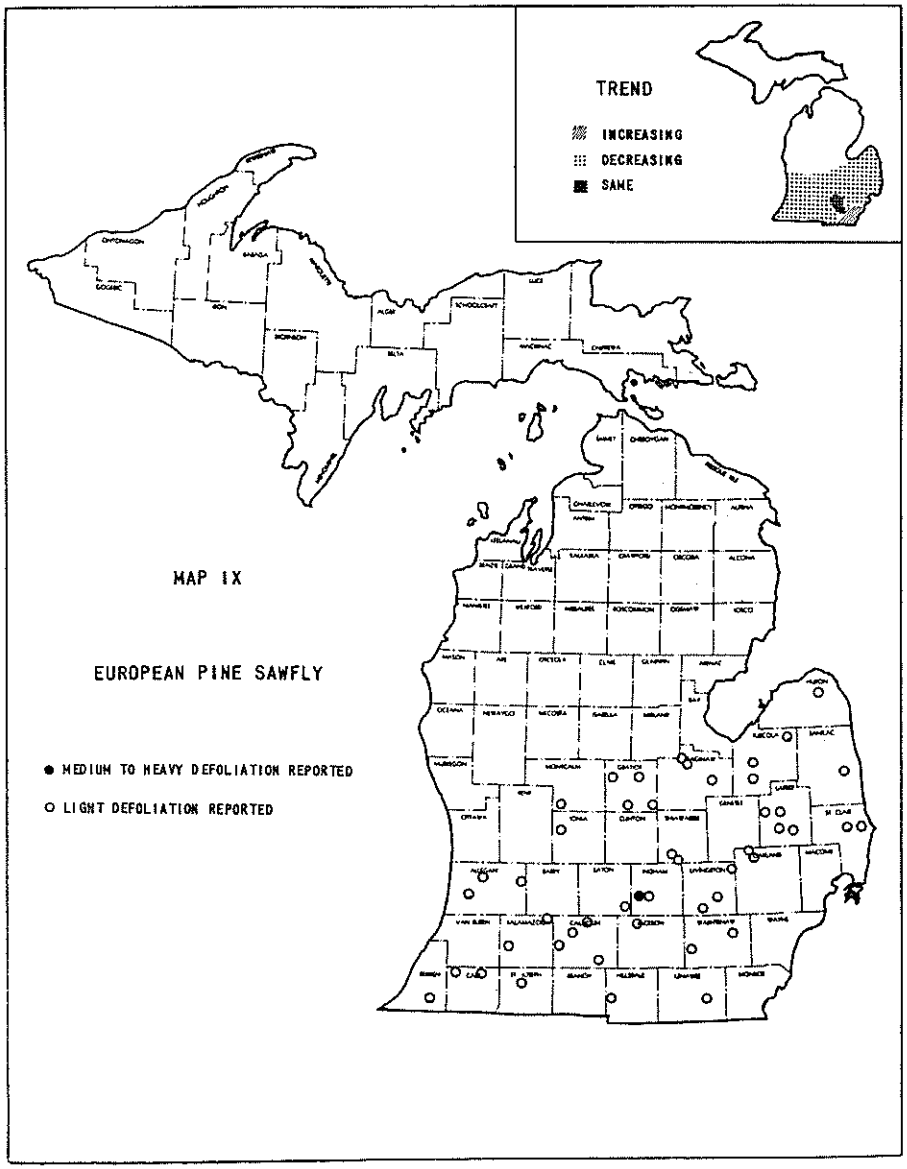
In the southern part of the Lower Peninsula the only important defoliator of hard pines is the European pine sawfly. This insect eats only the old needles and thereby reduces the growth and vigor of the trees but does not kill them.

Heavy defoliation was reported from Ingham County. Only light defoliation was observed on the reporting areas in the rest of the southern counties.

The sawfly appears to be increasing in the southeastern counties, remaining the same in Clinton, Shiawassee, Eaton and Ingham counties and decreasing throughout the rest of the southern part of the Lower Peninsula.

This pest is generally kept from causing widespread defoliation as it is easy to control, occurs in areas of small scattered pine stands and in an area of intensive plantation management. (See Map IX.)


TREND
INCREASING
DECREASING
SAME
MAP VIII
EUROPEAN PINE SHOOT MOTH
MEDIUM TO HEAVY INJURY REPORTED
LIGHT INJURY REPORTED


TREND
INCREASING
DECREASING
SAME
MAP IX
EUROPEAN PINE SAWFLY
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED

FOREST TENT CATERPILLAR - Malacosoma disstria Hbn.

Summary of Reports

	1954	1955	1956	1957	1958
Total.....	117	120	111	114	109
Percent Positive.....	23	17	5	4	0

Breakdown of 1958 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....0.....(0%)
Light defoliation (1-20%).....0.....(0%)

For the first time since 1950, no areas in Michigan were reported as being defoliated by the forest tent caterpillar.

SPRUCE BUDWORM - Choristoneura fumiferana (Clem.)

Summary of Reports

	1956	1957	1958
Total.....	40	29	30
Percent Positive.....	2	3	3

Breakdown of 1958 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-100%).....0.....(0%)
Light defoliation (1-20%).....1.....(100%)

No areas of spruce budworm outbreaks were found in Michigan. Throughout the Upper Peninsula a few larvae could be found in spruce-fir stands; however, noticeable defoliation was reported only in one stand.

* * *

GYPSY MOTH - Porthetria dispar (L.)

The following information on the gypsy moth was received from the Division of Plant Industry, Michigan Department of Agriculture, and is a summary of their work on the gypsy moth during 1958.

"The 1957 trapping program in Michigan did not result in any male moth recoveries, and therefore, there was no aerial spray program conducted in the spring of this year. All spraying is based on the trapping results of the preceding summer.

"The 1958 trapping program embraced an area of 1,499 square miles in the following central Michigan counties: Calhoun, Clinton, Eaton, Ingham, Ionia, Jackson, and Shiawassee. Starting in June, fifteen seasonal trap tenders were employed to conduct the trapping phase of this program. A total of 3,954 traps were set in the 1,499 square miles surveyed. These traps were checked every seven to ten days throughout the season.

"Fifteen moths were caught in seven traps and all were taken between July 31 and August 25 with the highest number appearing in traps the week of August 10-16 when nine were caught.

"The moth finds represent two widely separated areas that are to be aerially treated in the spring of 1959. These two areas are 21 miles apart. Only one of the moths trapped this season came out of a previously sprayed area. All others were caught one to three miles from any treated acreage. It appears to date that approximately 20,480 acres will have to be treated in May of 1959."

RED-HUMPED OAKWORM - Symnerista albiscosta (Hbn.)

The red-humped oakworm defoliated oak on 20,940 acres in Lake, Newaygo, Muskegon, Ottawa, Allegan, Mason and Oceana counties in the Lower Peninsula. (See Special Surveys.) This pest is mainly an annoyance to the residents of the infested area. Oak stands are usually defoliated for only one or two years before the insect population declines. Most of the areas heavily infested in 1957 were not again stripped in 1958. (See Map II.)

LARGE ASPEN TORTRIX - Archips conflictona (Wlk.)

The large aspen tortrix larvae caused scattered defoliation throughout most of the Upper Peninsula, in some places eating 75 percent or more of the aspen leaves. Heaviest feeding occurred in Keweenaw, Houghton, Ontonagon and Gogebic counties. This pest was relatively scarce in Chippewa County in 1958 after being abundant in 1957. The tortrix is not considered a serious pest as defoliation usually does not occur for more than one or two years.

FRUIT TREE LEAF ROLLER - Archips argyrospila (Wlk.)

Parasites and late spring frosts drastically reduced the fruit tree leaf roller populations in the central Lower Peninsula region so that practically no defoliation of oak was noted. Tree mortality has occurred on the poorer sites in the area defoliated in 1956 and 1957 and is probably due to a combination of the defoliation, severe drought conditions and late spring frosts.

ZIMMERMAN PINE MOTH - Dioryctria sp. probably zimmermani (Grote)

The Zimmerman pine moth continues to be responsible for deforming pole size red pine on 3,800 acres in Wexford County in the Lower Peninsula. Repeated killing of part of the new growth has resulted in bushy, distorted trees. (Figure 4.)

This insect is becoming an important pest of Scotch pine Christmas trees in the southwestern Lower Peninsula. On the small trees, two types of damage are caused, viz., boring into the main stem at the base of the new growth, killing the tree above; and mining in the new growth, killing the outer end of the branch. (See Map II.)

Figure 4.

Zimmerman pine moth caterpillars feed in the new growth of red pine causing the crowns to become distorted and bushy.

PINE ROOT COLLAR WEEVIL - Hylobius radicus Buch.

Scotch pine in roadside plantings continued to be killed by the pine root collar weevil in the central and west central parts of the Lower Peninsula. One plantation of 3' to 6' Scotch pine in Presque Isle County was reported to have 20% of the trees dead or dying, and a plantation of 10 foot red pine in Crawford County had some trees killed. Generally, forest plantations have not been attacked.

BIRCH LEAF SKELETONIZER - Bucculatrix canadensisello Chamb.

Birch leaf skeletonizer defoliation increased in the Upper Peninsula and northern half of the Lower Peninsula. The defoliation occurs late in the summer and should have very little effect on the trees even if repeated several years.

RED PINE CONE BEETLE - Conophthorus resinosae Hopkins

Red pine, pole size and larger, growing near the shores of the Great Lakes, were attacked by the red pine cone beetle in Keweenaw, Leelanau, Manistee and Benzie counties. The new growth is partly mined, killing the terminal half and causing some deformation of the tree crown. Normally this insect is a cone feeder and feeds in the new shoots only when cones are scarce. (See Map II.)

MAPLE PETIOLE BORER - Caulocampus acericaulis (MacGillivray)

Maple in parts of eastern Gogebic and western Iron counties was lightly attacked by the maple petiole borer, causing some leaf drop.

PINE SPITTLEBUG - Aphrophora parallela (Say)

Scotch pine branch tips were killed by the pine spittlebug near Fife Lake in Grand Traverse County.

MITES

Mites were more abundant than usual throughout the Lower Peninsula and were responsible for browning of spruce and pines.

APHIDS

Young white pine was killed by heavy aphid infestations in Lake County near Baldwin and Montcalm County near Fenwick.

FALL WEBWORM - Hyphantria cunea (Drury)

The fall webworm was common in the southern part of the Lower Peninsula and caused complete defoliation of ash on several acres near Stanton in Montcalm County.

INTRODUCED PINE SAWFLY - Diprion simile (Htg.)

The introduced pine sawfly was found in Otsego County near Gaylord, adding a fourth county to Antrim, Charlevoix, and Kalamazoo counties where it was found for the first time in 1957. This sawfly can become a serious defoliator of white pine.

A SCARAB BEETLE - Dichelonyx linearis (Gyll.)

Maple and other hardwoods suffered light to moderate defoliation in limited areas in Houghton, Ontonagon, Baraga and Gogebic counties in the Upper Peninsula when fed upon by Dichelonyx linearis (Gyll.). (See Map II.)

JACK PINE SAWFLY - Neodiprion banksianae Roh.

The jack pine sawfly has for several years been responsible for defoliating a 40 acre stand of jack pine in Roscommon County in the Lower Peninsula.

WALKINGSTICK - Diapheromera femorata (Say)

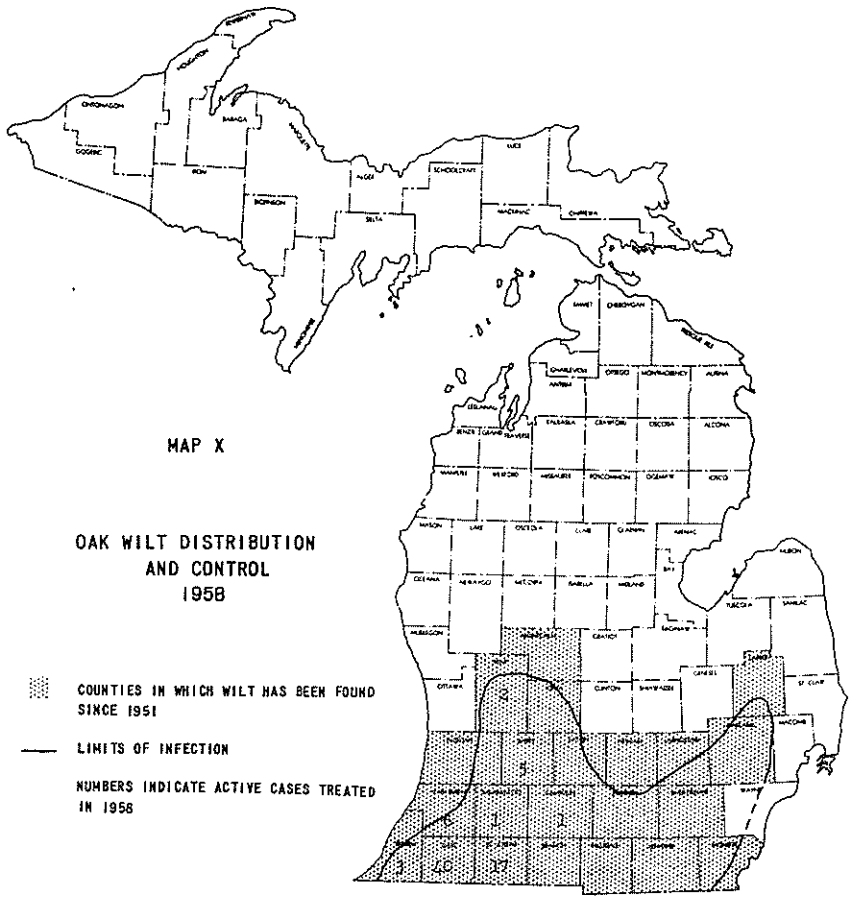
Walkingstick defoliated oak on 800 acres in Dickinson County in the Upper Peninsula. Greatly reduced populations occurred in Ogemaw County causing heavy defoliation in only a few areas and light defoliation on 45,000 acres. (See Map II.)

* * *

DISEASES

OAK WILT

Oak wilt disease was first confirmed in Michigan in 1951, although there is evidence to show that it had been present in the state for several years prior to that time. Annual surveys since 1951 have located the disease in 22 southern Michigan counties, with the greatest concentration in the southwestern



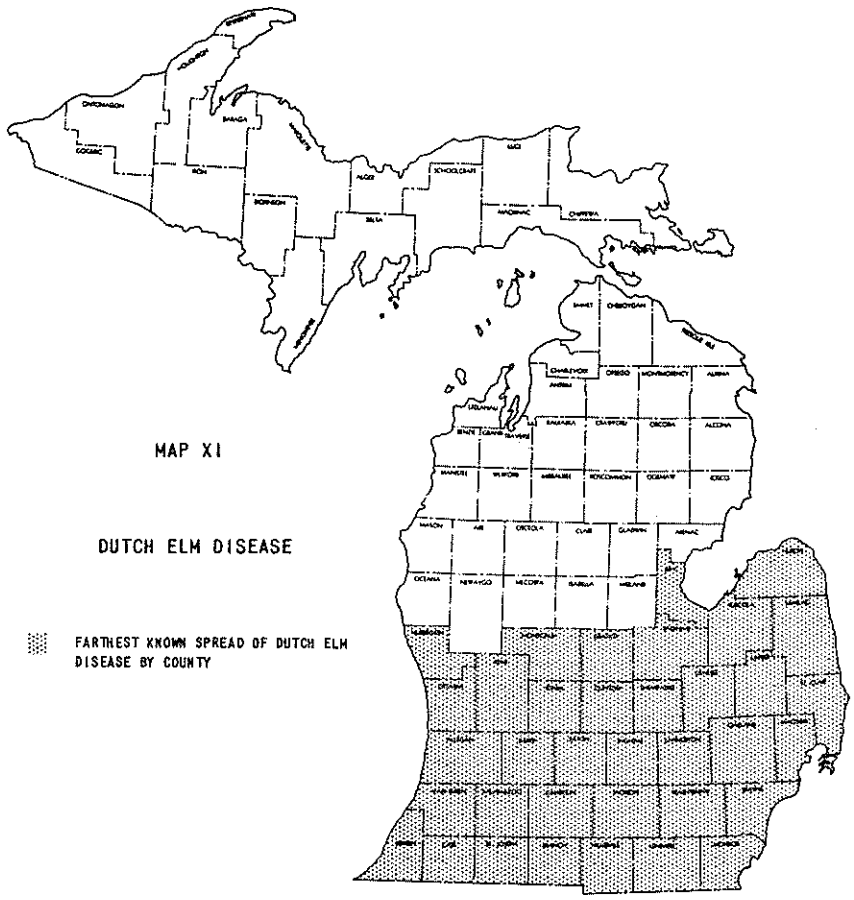
MAP X

OAK WILT DISTRIBUTION
AND CONTROL
1958

COUNTIES IN WHICH WILT HAS BEEN FOUND SINCE 1951

LIMITS OF INFECTION

NUMBERS INDICATE ACTIVE CASES TREATED IN 1958



MAP XI

DUTCH ELM DISEASE

FARTHEST KNOWN SPREAD OF DUTCH ELM DISEASE BY COUNTY

area. In spite of its persistence over the years, the disease has spread rather slowly, a fact which lends considerable hope to the control program.

Two Conservation Department planes were used in the 1958 aerial survey in which seven heavily infected southwestern counties were covered at one mile intervals, and all known locations in other counties were spot-checked. The intensively flown counties were Barry, Calhoun, Cass, Kalamazoo, Kent, St. Joseph and Van Buren. Flying was done between June 16 and July 30. Flying time for the season totaled 79.9 hours at a cost of $552.53 for planes and pilots. This cost was shared approximately equally by the Conservation Department and the State Department of Agriculture.

Suspected wilt spots located from the air, as well as old known locations, were checked on the ground by Conservation Department district foresters and State Department of Agriculture field inspectors to determine the presence or absence of active wilt. Wilt was found in an active condition at a total of 75 locations, two-thirds of these being new spots. This brings the total known locations, active and inactive, to 402.

A full-scale control program was undertaken by the State Department of Agriculture for the third year. Encouraged by the results of the previous years, the same technique of using 2,4-D ester was followed. The treatment includes the axe-girdling of the infected trees plus those healthy oaks within root range of the infected ones. The chemical is applied to the girdles to hasten the death of the trees and prevent sprouting. This treatment is designed to prevent spore mat formation on the diseased tree, and to break the underground link to adjoining trees by preventing spread through root grafts. A total of 130 infected trees, and approximately 400 healthy surrounding trees were treated during the 1958 season. In the 1957 season there were 204 infected trees treated.

While new wilt cases were found this year, the number was below previous years, and the recurrence of wilt at spots previously treated was encouragingly low. Thus it appears that some progress is being made. However, it may take perhaps two or three more years before a definite trend is established.

Map X. shows the range of oak wilt in the state and the number of areas treated in 1958 by counties.

DUTCH ELM DISEASE

Dutch elm disease was discovered in the Detroit area in 1950, and has since spread across the southern part of the Lower Peninsula and as far north as Bay and Muskegon counties. (See Map XI.)

A cooperative program of survey and control is coordinated by the State Department of Agriculture working with local units of government. This department is responsible for the survey and enforcement phase of the program, and the municipalities conduct the necessary sanitation and spraying. Laboratory facilities for diagnosing Dutch elm disease and oak wilt are maintained at

Michigan State University; and the laboratory is permanently housed in the new State Department of Agriculture Chemical Control Laboratories Building.

The following statement regarding the 1958 Dutch elm disease program was prepared by the Division of Plant Industry of the State Department of Agriculture.

"Thirty-three seasonal employees were utilized during the 1958 Dutch elm disease survey. They spent the better part of June, July, and August assisting city foresters and other municipal officials in taking samples of trees in their communities exhibiting the symptoms of this disease. The southern half of the Lower Peninsula was encompassed by this year's survey.

"Cooperative efforts toward control of Dutch elm disease are exercised only within municipal or park areas known to be carrying on a spray and sanitation program. It is virtually impossible to extend this type of cooperation into the rural areas because it is prohibitive for farmers to spray in extensive tracts of woods. The elm has little or no aesthetic value in such areas.

"This was the second year in which a noticeable decrease of diseased trees was evident in communities which have conducted a spray and sanitation program in past seasons. There were 10,440 samples submitted to the Department of Agriculture's pathological laboratory for analysis. Approximately 8,585 of these samples proved to be positive, and the trees from which these samples were taken were immediately condemned and ordered destroyed. In order to lessen the hazard of bark beetle population increases and new infections of the disease, 5,640 dead trees and 479 elm woodpiles also were condemned and ordered destroyed.

"In comparison with last year's program, there were 1,200 more samples submitted to the laboratory, 1,200 more diseased trees condemned, 1950 fewer dead trees and 70 less elm woodpiles ordered destroyed during 1958."

In addition to sanitation and control programs carried on by municipalities, the Parks Division of the Conservation Department has had a Dutch elm disease program in its southern Michigan state parks and recreation areas since 1953. No special funds were available for this work until 1956 when $75,000 was appropriated. These funds were allotted as follows: Sanitation work contracts, $38,912.50; equipment purchased for spray program, $12,800: spraying material, $10,922.50; personnel for spray program, $9,500; travel expense, $1,000; equipment operation and maintenance, $1,865.

In 1957 laboratory samples were taken on 164 trees, positive reports returned on 124, and 124 trees were removed. In the Fall of 1956, 2,862 gallons of spray material were used to spray 5 areas. In the Spring of 1957, 11 areas were sprayed using a total of 3,555 gallons of spray material and spraying a total of 38,901 trees. Sanitation contractors removed dead wood, topped trees and treated wounds on a total of 5,621 trees in five areas. The trees that were removed and all the dead wood that was pruned out of the trees was cleaned up by prison labor where available or regular park personnel.

DUTCH ELM DISEASE (Cont'd.)

The appropriation for 1957-1958 for the control of Dutch elm disease was also $75,000 and the allotments were made as follows: Sanitation contract, $57,313.61; equipment purchased for sampling program, $1,205.40; spraying material purchased, $5,758.20, personnel funds of spray program, $7,341.96; travel expense for spray program, $1,151.75; equipment operation and maintenance, $2,229.48.

For the year of 1958, samples were taken on 132 trees, and 78 positive reports required the removal of 78 trees. The spray program for this period was conducted in 16 areas. A total of 5,587 gallons of spray material was used to spray 58,842 trees. Sanitation contractors worked in 14 areas removing dead wood and treating wounds on 15,007 trees and topping 40 trees.

It is believed to date that some measure of success is being obtained in the control of this disease in the park areas. One fact that bears this out is that nine out of the 16 areas being treated did not have an infected tree reported in 1958, and two others only had one tree in each that was infected.

WHITE PINE BLISTER RUST

A detailed report of the white pine blister rust situation and control program is prepared annually by the Area Leader for this cooperative federal-state project. A brief summary of this report for 1958 follows:

"Blister rust control operations were carried on in the Upper Peninsula and the northern part of the Lower Peninsula. Control of blister rust spread is accomplished by destroying ribes bushes (Currants and gooseberries) within the white pine stand and around the edges of the stand. Ribes were destroyed on 37,817 acres of control area to protect 14,800 acres of white pine reproduction. Protection was accomplished by destroying 876,000 ribes bushes.

"Control work was done on National and State Forests and private lands. The bulk of labor was provided from Corrections Department trustee camps for work on State and private lands. Work on National Forests was financed by federal funds.

"Blister rust infection on ribes leaves was light in the Lower Peninsula south of Bay City-Muskegon line. Infection increased northward but was not as heavy or general as in past years. It is believed that the dry summer prevented intensification. Blister rust cankers of 1956 origin are now killing large numbers of white pine seedlings up to a foot in height.

"At the present time there are approximately 476,000 acres of white pine on record with a control area of 1,310,000 acres. Approximately 89 percent of the control area has been initially worked and 46 percent has been placed on maintenance. Most of the unprotected white pine is in State and private ownership.

"In most areas south of the Bay City-Muskegon line, white pine can be grown without much danger of blister rust damage. Ribes should, however, be

destroyed around white pine stands growing at elevations of 1,000 feet or over. North of the Bay City-Muskegon line ribes eradication is necessary to assure fully stock stands of white pine. The need for a stepped-up control program is urgent on State and private lands which cannot be reached from trustee camps.

MAPLE BLIGHT

In the summer of 1957 a mysterious disease which has been called "maple blight" caused concern when it appeared in a limited area near Goodman in northern Wisconsin. Little was known about the disease which killed hard maples of all sizes. A research project was set up under the Lake States Forest Experiment Station, to study the problem and a survey was organized in 1958 to determine the extent of the disease. In Michigan the field organization of the Pest Detection Program was utilized to examine and report on any areas of dying maple which appeared to have the symptoms exhibited in the Wisconsin area.

Several suspicious areas were reported by Michigan observers and subsequently examined by Dr. Gene Hesterberg of Michigan College of Mining and Technology, working in cooperation with the Experiment Station. Blight conditions were not present in any of the areas thus checked. The dying or wilting in these areas was usually attributed to drought conditions.

According to a progress report from the Experiment Station in November, 1958, research has as yet not identified the exact cause of the blight condition. It is the general thinking of those working on it that it is caused by a combination of many factors, both pathological and environmental.

SWEETFERN BLISTER RUST

The cooperation of the Pest Detection Program field organization was requested by the Lake States Forest Experiment Station in locating jack pine areas infected with sweetfern blister rust (Cronartium comptoniac). This was in connection with a new research project underway at the Station to study occurrence and effects of this stem cankering disease. According to the Station, some stands show 20 to 30 percent infection.

* * *

SUMMARY

State, private and federal foresters submitted a total of 1,966 observation reports during the 1958 season.

The Conservation Department prepared and distributed new forest pest information leaflets on the birch skeletonizer, walkingstick, pine spittlebug, pine sawyer beetle, pine needle rust, hardwood defoliators and eastern gall rust. In addition, the leaflets on the European pine shoot moth and white pine weevil were revised and brought up to date. All 20 leaflets prepared so far were assembled in a booklet entitled "Michigan Forest Pests."

Special surveys on 3,077 acres of state land were made for the red-headed pine sawfly and disclosed the need for control measures on 885 acres. An airplane was used to map the red-humped oakworm defoliation in the Lower Peninsula. The United States Forest Service conducted surveys on the Saratoga spittlebug, red-headed pine sawfly, white pine weevil, European pine shoot moth and jack pine budworm.

Control projects on state land were directed against the red-headed pine sawfly, white pine weevil, European pine shoot moth, Dutch elm disease, white grubs and white pine blister rust and on United States Forest Service land against the red-headed pine sawfly, European pine shoot moth, white pine weevil, Saratoga spittlebug and white pine blister rust.

Jack pine budworm populations declined greatly throughout most of the Lower Peninsula and were the lowest in several years.

Red-headed pine sawfly infestations remained at the same high levels as in 1957 in the northwestern Lower Peninsula. Colonies became increasingly abundant in northeastern Lower Peninsula and Upper Peninsula.

Larch stands throughout the Upper Peninsula and northern Lower Peninsula were heavily defoliated by the larch sawfly.

Saratoga spittlebug populations have increased through much of the Lower Peninsula and serious damage was found in many stands.

The white pine weevil remained at a high level, deforming young pines.

Anomala beetle infestations continued to decline and were generally very light.

European pine shoot moth continues to be the most serious and difficult to control pest of red pine in Michigan. A new location was found in Chippewa County in the Upper Peninsula.

The European pine sawfly increased in the southeastern counties and generally decreased through most of the southern part of the Lower Peninsula.

No defoliation by the forest tent caterpillar was reported for the first time since 1950.

Red-humped oakworms defoliated oak on 20,940 acres in the western Lower Peninsula.

Pine root collar weevil, Zimmerman pine moth, large aspen tortrix and other insects caused defoliation or damage of local concern or interest.

No aerial spray program for gypsy moth control was carried on in 1958 due to the negative trapping program results in 1957. Positive trapping results in 1958 will necessitate a control program during 1959 by the Department of Agriculture.

1958 was the second year in which a decrease in Dutch elm disease infected trees was noted in areas which have conducted spray and sanitation programs in past seasons.

Aerial survey for oak wilt in heavily infested counties in southwestern Lower Peninsula detected 50 new spots and 25 active, old ones. Control results by girdling and chemically killing infected and surrounding trees have been encouraging.

Ribes eradication was done on 37,817 acres of control area to give protection to white pine from the blister rust on 14,800 acres.

* * *